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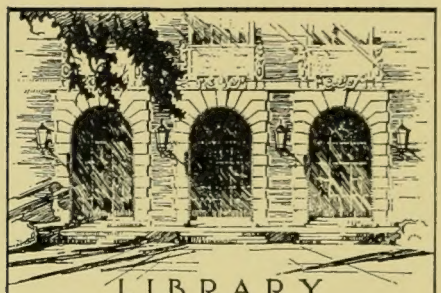

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THE FILMY FERN IN ILLINOIS

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THE FILMY FERN IN ILLINOIS

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The filmy fern, Trichomanes boschianum Sturm, fig. 1, is one of the rare ferns in North America. It is a perennial, evergreen plant with very slender, creeping, wirelike rootstocks and with fronds that have light green, translucent blades only one cell thick. This fern is a member of the filmy fern family, the Hymenophyllaceae, a family of more than 300 species, which occurs throughout the tropics and in New Zealand. One species occurs in central Europe. T. boschianum grows in southeastern North America, where it ranges from Alabama northward to West Virginia, Ohio, and southern Illinois. It apparently has a very restricted habitat; it requires, in most cases, moist, shaded, vertical faces at the bases of sandstone overhangs.

With the destruction of our natural landscape to provide for more and wider highways and for more home sites, and with the construction of dams and the consequent flooding of large areas behind the dams to form artificial lakes, we do not know how long some of the habitats of our rare plants will remain intact. Therefore I have written this article to record for botanists and other interested persons the known locations of the rare filmy fern in southern Illinois. I have recorded the information chronologically so that readers may experience vicariously the pleasure I experienced in my search for sites of the filmy fern.

For many years the filmy fern was known to occur in southern Illinois at a station in Jackson Hollow in Pope County, fig. 2, locality 5. This knowledge was based upon collections made on August 2, 1923, by Dr. Mary M. Steagall of Southern Illinois University. These collections are now in the herbarium of that university and the herbarium of the University of Illinois. The next known collections in Illinois were made more than a quarter of a century later by Julius Swayne and myself. Mr. Swayne was at the time a student at Southern Illinois University and later at the University of Illinois. Bailey & Swayne (1952) stated that this site was the one in which Dr. Steagall collected the fern; they wrote, "Our collection [Swayne 1136] undoubtedly is from the same location." Most botanists in Illinois have accepted this conclusion, and, as there is no evidence to the contrary, I shall refer to this locality as the Steagall site. It is in the E 1/2, sec. 6, T. 12 S., R. 5 E.

In 1955 Franklin Buser, then a graduate student at the University of Illinois, now of East Stroudsburg, Pennsylvania, called to my attention an almost unknown article by Miss Helen M. Strong (1921), who had been a student in one of the classes of Dr. H. C. Cowles of the University of Chicago. Miss Strong reported the occurrence of filmy fern (Trichomanes boschianum) on sandstone in Bethell Hollow in Pope County. After reading her article I became convinced (and I believe I convinced Mr. Buser) that Bethell Hollow and Jackson Hollow were the same place. The description seemed to pertain to the Steagall site in Jackson Hollow; two of the plants which Miss Strong listed for the Bethell Hollow station, neither of which is common in Illinois, namely, rattlesnake plantain (Goodyera pubescens) and "ground pine" or club moss (Lycopodium lucidulum), also were growing at the Jackson Hollow station. Miss Strong had not collected specimens from Bethell Hollow.

*Robert A. Evers is Associate Botanist, Illinois Natural History Survey. The photography is the work of William E. Clark, who visited all the known localities of the filmy fern in Illinois and took numerous photographs of the sites and the ferns. Miss Marguerite Verley drew the map that is fig. 2. James S. Ayars edited the manuscript. Mrs. Betty Nelson typed the manuscript for reproduction.

Fig. 1.--Delicate fronds of filmy fern growing on moist sandstone in the north section of Jackson Hollow, southwest of McCormick, Pope County.

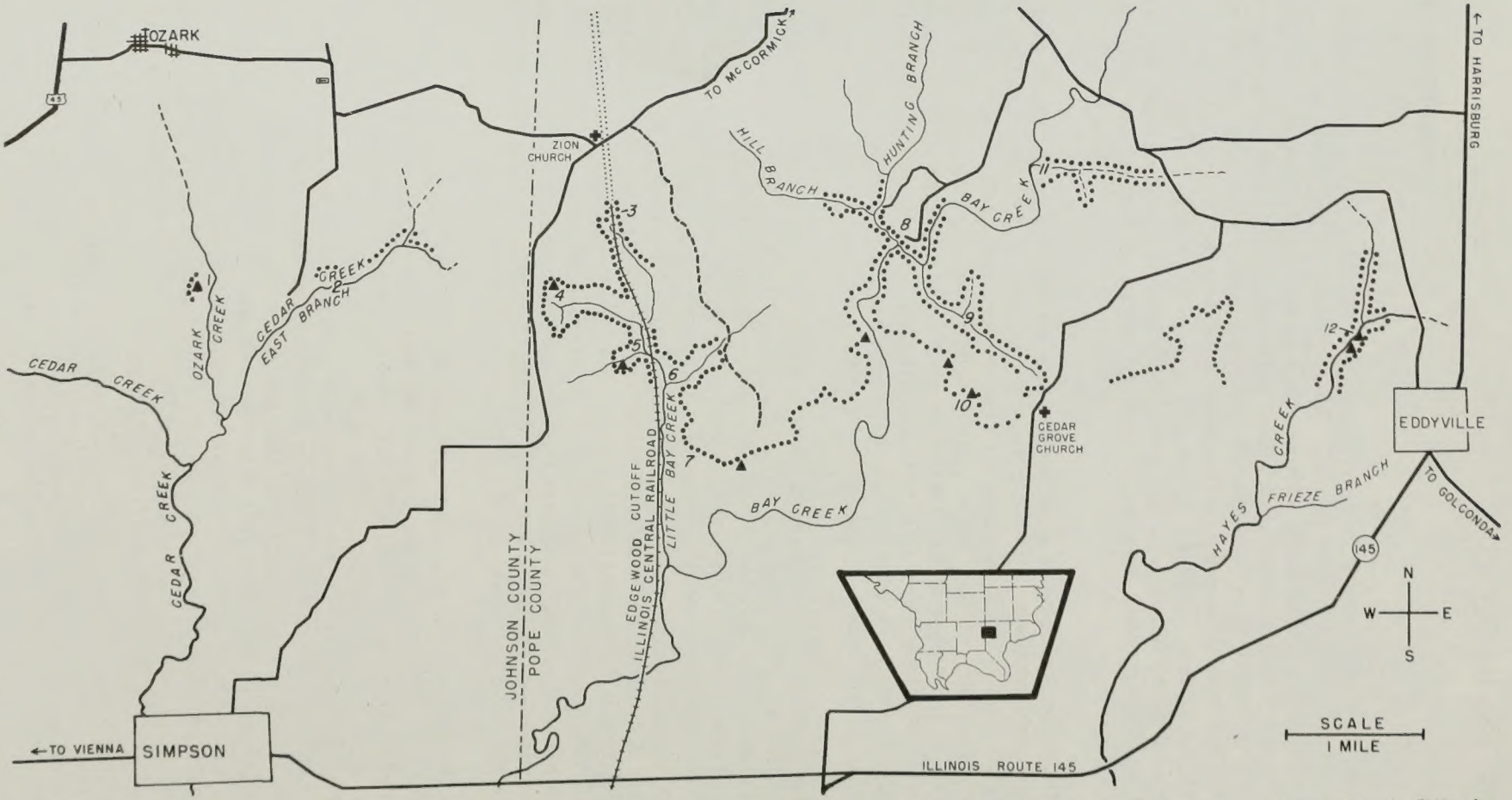

Fig. 2.--Map of parts of northeastern Johnson and northwestern Pope counties, showing the known locations of filmy fern in Illinois. Sandstone cliffs which were examined are shown by series of dots. Stations of filmy fern are represented by solid triangles. Highways are represented by solid black lines; state and federal highways are numbered. A less traveled road is designated by a series of heavy dashes. Localities are (1) a private camp area along an abandoned railroad trackway; (2) Camp Packentuck, an abandoned Boy Scout Camp; (3) Bethell Hollow, now south entrance of tunnel (shown by small dots), on the Edgewood cutoff of the Illinois Central Railroad; (4) Jackson Hollow, north section; (5) Jackson Hollow, south section; (6) Lawrence Hollow; (7) Wallace School site (the school has been abandoned and removed); (8) Belle Smith Springs Recreation Area; (9) Spring Branch; (10) Sand Cave; (11) Hurricane Branch; (12) Hayes Creek Canyon. The inset shows a county outline map of Illinois south of 38 degrees north latitude; the black rectangle is in Johnson and Pope counties and designates the area represented on the detailed map.

On October 23, 1957, a little more than 34 years after Dr. Steagall made the first Illinois collection of filmy fern, Dr. M. W. Sanderson, an insect taxonomist on the staff of the Illinois Natural History Survey, and I discovered another station of this fern in Pope County, at Hayes Creek Canyon, north of Eddyville (Evers 1958). On November 19, 1957, William E. Clark, Survey staff photographer, accompanied me to the Hayes Creek Canyon locality, fig. 2, locality 12, and photographed the stand, fig. 3. We explored the cliffs beyond and discovered an additional stand about one-fourth mile from the one found in October. Although I collected specimens from the first station in Hayes Creek Canyon, I did not collect specimens from the second. The discovery of the two stations in Hayes Creek Canyon made me doubt my earlier conclusion concerning Bethell Hollow. But where was Bethell Hollow?

Neither Bethell Hollow nor Jackson Hollow is shown on a topographic map. Names of such places are local, and the exact locations must be obtained from persons residing in the vicinity. In January, 1958, I wrote to Coy King of Eddyville,

Fig. 3.--Filmy fern on the vertical sandstone of the base of an overhang in Hayes Creek Canyon, north of Eddyville, Pope County.

a local authority on northern Pope County, and asked if he knew the location of Bethell Hollow. He replied that Bethell Hollow was a ravine through which part of the Edgewood cutoff of the Illinois Central Railroad had been laid. The ravine (in sec. 31, T. 11 S., R. 5 E.) was at the south end of a long tunnel.

Weather did not permit me to go to southern Illinois until the next month. On a warm February day I arrived in Ozark, which is in Johnson County and about 10 miles from Eddyville. As a check on the location I asked Connie Faulkner, an elderly resident of Ozark, if he could direct me to Bethell Hollow. He informed me that it was the ravine at the south end of the long tunnel of the Edgewood cutoff. I thanked Mr. Faulkner and proceeded to the south end of the tunnel, fig. 2, locality 3.

The area had been much altered since 1920, the year in which Miss Strong made her visit to southern Illinois. The drainage pattern had been greatly disturbed about 1925 in the construction of the tunnel and in making a deep cut, about one-half mile long, for the roadbed of the railroad, figs. 4 and 5. Instead of a single stream in the ravine, two streams now flowed parallel to the cut and were held high upon the

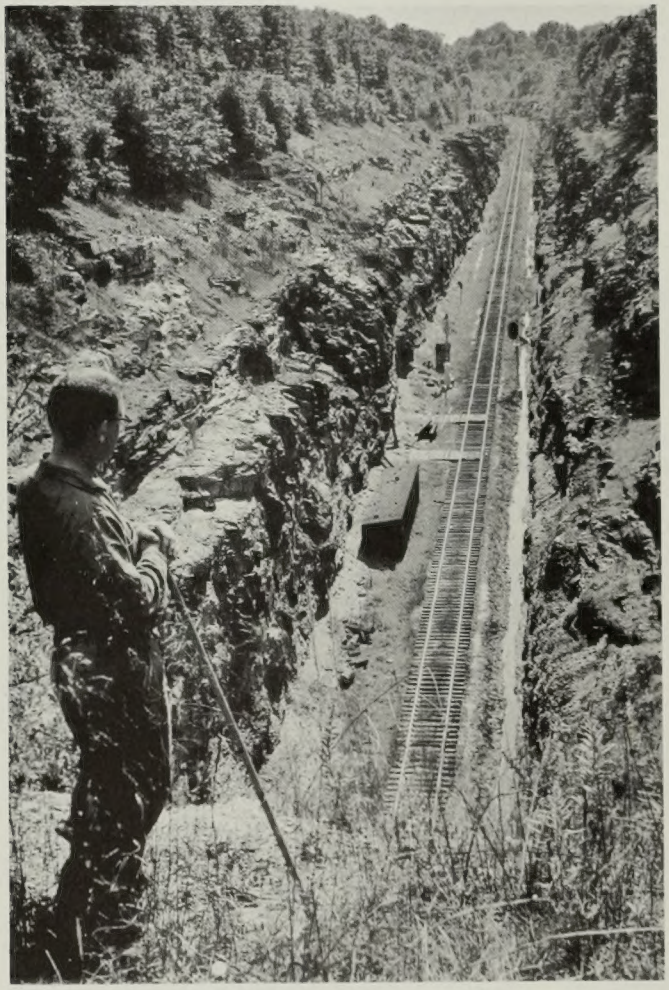

Fig. 4. --Trackway of the Illinois Central Railroad (Edgewood cutoff) in the 0.5-mile cut through the section that was formerly known as Bethell Hollow. The drainage pattern in this locality has been considerably altered since filmy fern was reported here in 1921.

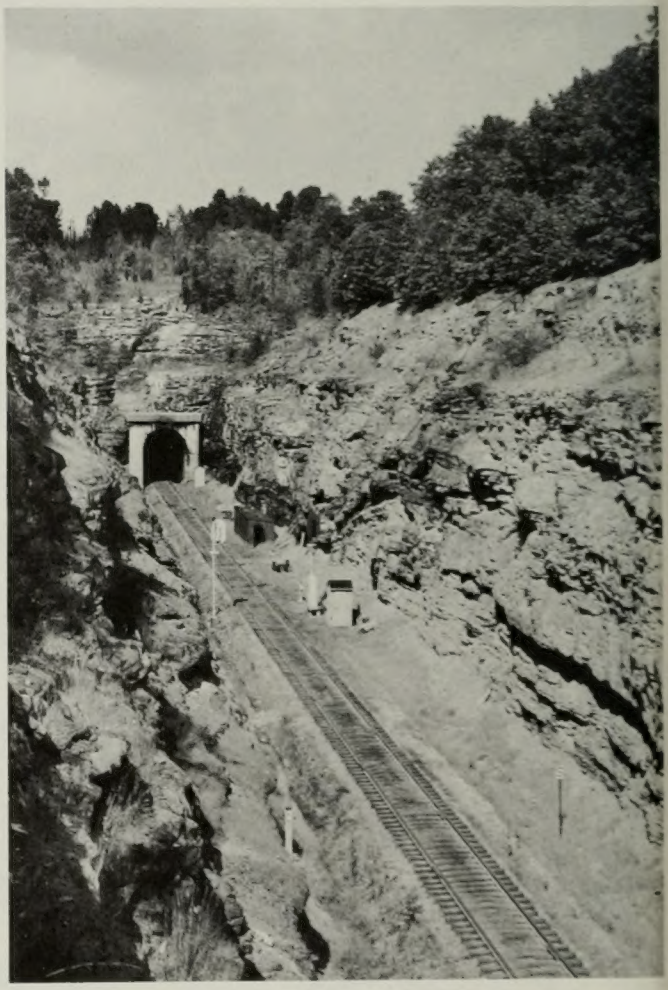

Fig. 5. --South entrance to the long tunnel on the Illinois Central Railroad (Edgewood cutoff) and part of the deep cut required in the construction of this section of the railroad. The fig. 4 photograph was taken from the rock ledge above the tunnel entrance.

ravine slopes by levees. The station of filmy fern that Miss Strong reported in this locality had without doubt been destroyed during the construction of the tunnel and the roadbed.

In February and April, 1958, I spent nine days walking along the bases of cliffs in Pope County. The cliff bases of Hurricane Branch, fig. 2, locality 11, and also those of Spring Branch, fig. 2, locality 9, both in the Belle Smith Springs area, were interesting to observe but did not support a growth of filmy fern. On April 3, 1958, at the suggestion of Mr. King, I visited Sand Cave, fig. 2, locality 10, in sec. 3, T. 12 S., R. 5 E. This is a sizable cave in the sandstone escarpment. I did not find filmy fern there and decided to follow the escarpment from the cave northwestward toward Bay Creek. My reward for the afternoon's hike was the discovery of two more stations of filmy fern a short distance from Sand Cave. These contained only small patches of the fern, fig. 6, but they were of great interest to botanists

Fig. 6.--A small patch of filmy fern growing in an overhang in the NW 1/4, sec. 3, T. 12 S., R. 5 E., northwest of Sand Cave in Pope County.

Fig. 7. --The Steagall site of the filmy fern in the south section of Jackson Hollow. When this photograph was taken in 1954, many fronds of the filmy fern were growing in this undercut.

Fig. 8. --The Steagall site of the filmy fern in the south section of Jackson Hollow. This photograph was taken July 22, 1959. Only a few fronds of filmy fern remained on the sandstone exposure, which was covered principally with mosses and liverworts.

because they were midway between the Jackson Hollow and the Hayes Creek Canyon stations. Filmy fern was now known from five stations in Pope County.

In the autumn of 1958 I was able once more to search the cliffs of Pope County for the filmy fern. On October 15 I revisited the Steagall site in Jackson Hollow, fig. 2, locality 5. The amount of the fern had been so greatly reduced since I first saw it in 1951 and especially since my fifth and most recent visit in 1954 when Mr. Clark photographed it, fig. 7, that I asked him to return and photograph the stand again. This he did on July 22, 1959, fig. 8. Mr. Clark remarked that the amount of the fern had been much reduced since his visit in 1954. On the morning of November 13, 1958, I examined the cliffs in Lawrence Hollow, fig. 2, locality 6, which is the ravine east of the railroad track and close to Jackson Hollow, south section. The search here was futile. In the afternoon I followed the cliffs which trend southward from Lawrence Hollow to a point beyond the old Wallace School site, fig. 2, locality 7, where in one overhang I found several patches of filmy fern growing lux-

Fig. 9. --A general view of the overhang near Wallace School site. At the time the photograph was taken, July 22, 1959, the overhang contained several patches of the filmy fern at the rear of the small grottoes shown in this view.

uriantly, fig. 9. There was more filmy fern in this place than in any or all of the five others. This locality, which lies only 1.2 miles southeast of the Steagall site in Jackson Hollow, was the sixth for Pope County.

It was not until March, 1959, that I was able to explore the cliffs of Pope County again for the filmy fern. On March 12 I followed the cliffs on the west side of Bay Creek south from Belle Smith Springs, fig. 2, locality 8. My goal was to follow these cliffs south and west to the point I had reached the previous November.

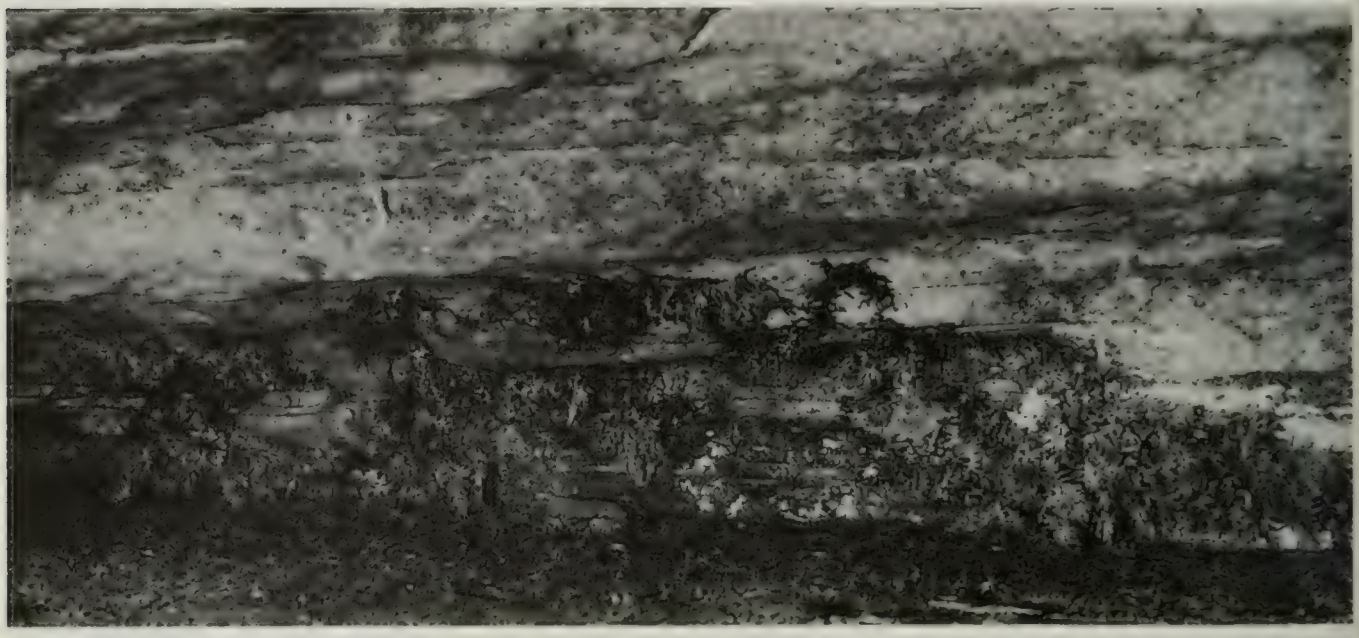

Fig. 10. --One of the three patches of filmy fern growing on the sandstone cliff along Bay Creek, south of Belle Smith Springs.

I was pleased to find in one of the overhangs four small patches of filmy fern, varying from 1 to 4 feet long and 2 to 4 inches wide, fig. 10. This station was the seventh for the fern in Pope County.

On the following day, March 13, 1959, I made my greatest discovery of filmy fern. I had returned to Jackson Hollow to follow the south-facing cliffs in the north section of the hollow, a stretch of cliffs that had previously escaped my attention, although I had often collected plants in Jackson Hollow. After carefully examining several sizable overhangs, I came to a huge, crescent-shaped overhang about 200 feet along the lip, more than 50 feet high at the front, and about 70 feet deep, fig. 2, locality 4. The floor was strewn with sandstone fragments varying in size from gigantic blocks to very small pieces. It was difficult to reach the small vertical face at the base of the overhang because of the fragments and dense vegetation. But what a reward! Here were three sizable patches of filmy fern, the first about a foot long, the second about 12 feet long, and the third about 40 feet! Here as elsewhere the fern grew on solid sandstone, but, as it had not done at the other sites, it also grew on some of the sandy material on the floor---material that doubtless had eroded from the cliff, fig. 11. The only record that I have found of the growth of filmy fern elsewhere than on sandstone cliffs, ledges, rocky walls, rock houses, and overhangs is that of Gillespie (1955), who reported a collection from Webster County, West Virginia, "at the edge of an old railroad grade, which parallels a sandstone cliff, ..." My interpretation of the description is that the fern was growing on sand

material that formed the railroad grade or ballast or that had earlier eroded from the sandstone cliff; apparently the fern was not growing on the cliff itself. The station in the north section of Jackson Hollow, the eighth for filmy fern in Pope County and in Illinois, contained more plants than all of the other seven stations combined. On March 20, October 8, and December 9, Mr. Clark visited this station with me and we photographed the overhang and the fern, fig. 12 and cover.

In all eight localities the fern is associated with Pounds sandstone. There appears to be no correlation, however, between the growth of filmy fern and a particular stratum. In some sites the plants grow on massive sandstone without apparent bedding planes. In others they grow on sandstone composed of numerous horizontal layers, each of which measures only 1 centimeter in thickness. They also grow on thicker layers, some of which are tilted at steep angles.

Direction of exposure of the plants is not constant. In the Steagall site in Jackson Hollow the exposure is northwestward; in the north section of Jackson Hollow the exposure is southeastward. In Hayes Creek Canyon it is west. In the Sand Cave

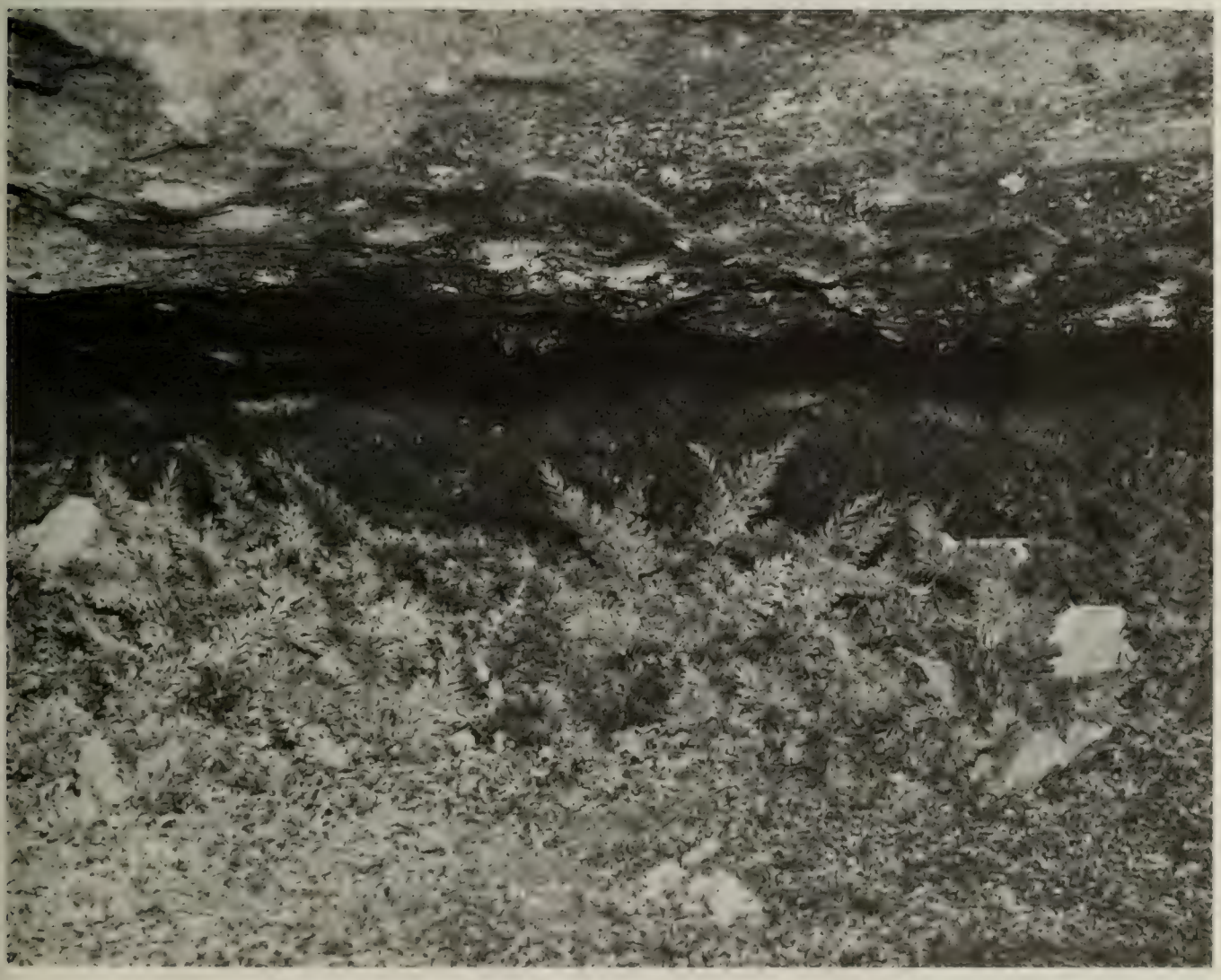

Fig. 11.--Filmy fern growing on the sand-covered floor at the base of the overhang in the north section of Jackson Hollow.

region it is west and southwest, along Bay Creek it is almost east, and near Wallace School it is east of south. Elevations are almost the same. Mohlenbrock & Voigt (1959) give the elevation of the Steagall site as 560 feet above sea level. I did not check the elevations at each locality by measurements from the nearest bench marks, but an examination of the topographic maps shows that in the seven other sites filmy fern grows at an elevation between 540 and 580 feet.

Light intensity may be an important control in the growth of the fern. Shaver (1954) observed that the destruction of trees and the consequent opening of the forest canopy destroys the fern. Forest destruction may partially account for the diminution of the fern at the Steagall site. Much of the American beech, Fagus grandifolia Ehrh., has been or is being removed in Jackson Hollow as a forestry measure to permit a better growth of tulip tree, Liriodendron tulipifera L. Such a measure in Jackson Hollow could spell doom to two stands of filmy fern in Illinois. Jackson Hollow should be maintained as a nature preserve because of this fern and other rare

Fig. 12.--Gigantic overhang in the north section of Jackson Hollow. At the base of the cliff grow three sizable patches of filmy fern. The two figures near the center of the picture serve as a scale to show the size of this overhang.

plants which grow there. I called this problem to the attention of Paul J. St. Amant, supervisor of the Shawnee National Forest. He asked Donald Dorn, a federal forester who was studying the Shawnee Forest as a possible recreation and scenic area, to visit Jackson Hollow with me and to make recommendations for the preservation of these rare plants.

On December 9, 1959, Mr. Dorn, Mr. Clark, and I visited the large stand of filmy fern in the north section of Jackson Hollow. Mr. Dorn was surprised at the amount of the fern in this overhang. The three of us were more surprised at the brilliant sunlight which penetrated the overhang on that clear December morning. We observed that at 10 A. M. the ferns were bathed in sunlight. We surmised that at this time of year some of the ferns may receive up to 2 hours of direct sunlight. Doubtless this is not the case in the spring and summer months. In those months the foliage forms a fairly dense canopy over the soil and shades the adjacent cliffs; also, in those months the position of the sun and the consequent angle at which its rays strike the overhang would make it impossible for the direct rays to reach the ferns. Apparently brilliant sunlight during the cold months of the year does not retard the growth of the fern. The amount and type of light that reaches the base of the overhang during the course of the daylight hours and through the seasons would make a very interesting study.

We left Jackson Hollow and drove to Hayes Creek Canyon, where we visited the two stations of filmy fern in that area, fig. 2, locality 12. The amount of fern we observed in the first station was about the same as that which Mr. Clark and I observed in 1957, fig. 3. In the second station we found that the fern was apparently on the decline; the fronds were very small in size and few in number.

Some daylight remained, and we decided to examine the escarpment of Pounds sandstone 2 miles south of Ozark in Johnson County, fig. 2, locality 1. The elevation of this escarpment is between 440 and 480 feet above sea level. As we were examining one of the overhangs, Mr. Clark discovered several patches of filmy fern, the first to be found in Johnson County. One patch, which contained plants with small, scattered fronds, covered an area of approximately 9 square feet. Higher up the cliff in a small niche another group of ferns grew in patches that measured 8 by 10 and 3 by 4 inches. Mr. Clark photographed the site, fig. 13, and I collected a sample for the Illinois Natural History Survey herbarium. This station, the ninth in the state, was the first in a county other than Pope. It is approximately 2.5 miles by air from the nearest Pope County site, the north section of Jackson Hollow.

How long the filmy fern will grow in the Johnson County site is conjectural. Much of the forest adjacent to the base of the escarpment had recently been cut. It appeared to Mr. Dorn, Mr. Clark, and me that this cliff, with an east-facing exposure, will be exposed in the mornings to the direct rays of the hot summer sun. This exposure, perhaps, will make it impossible for the filmy fern to survive.

In order to bring the information on the collections of filmy fern in Illinois up to date, the following records, which represent specimens in the herbarium of the Illinois Natural History Survey (ILLS), should be added to those cited by Mohlenbrock & Voigt (1959):

JOHNSON COUNTY: On sandstone, Ozark Creek, 2 miles south of Ozark, December 9, 1959, R. A. Evers 63236. POPE COUNTY: On sandstone, Hayes Creek Canyon, north of Eddyville, October 23, 1957, R. A. Evers 55741; February 26, 1958, R. A. Evers 55831 (duplicate in herbarium of Illinois State Museum, Spring-

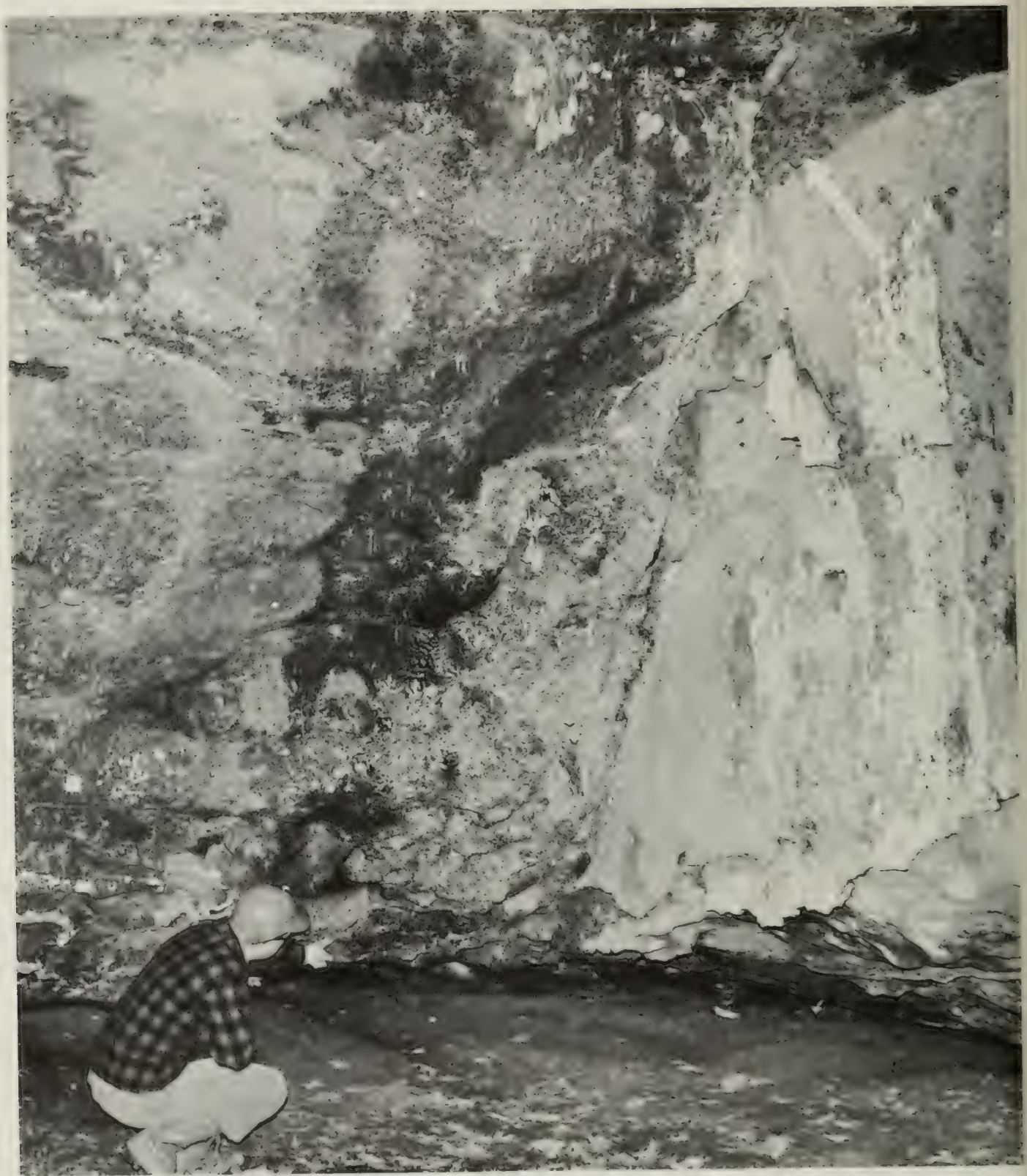

Fig. 13 .--Filmy fern on sandstone, Ozark Creek, 2 miles south of Ozark, Johnson County, December 9, 1959. The largest patch is near the base of the cliff. The arrow points to a small patch higher up the cliff. Because the forest has been cleared from the front of the escarpment, this stand of filmy fern may be doomed to destruction.

field); on sandstone, NW 1/4, sec. 3, T. 12 S., R. 5 E., about 3.5 miles west of Eddyville, April 3, 1958, R. A. Evers 55858; on sandstone, SW 1/4, sec. 3, T. 12 S., R. 5 E., about 3.5 miles west of Eddyville, April 3, 1958, R. A. Evers 55861; on sandstone, Jackson Hollow (south section), southwest of McCormick, October 15, 1958, R. A. Evers 59461; on sandstone near Wallace School, north of Robbs, November 13, 1958, R. A. Evers 59774; on sandstone, Bay Creek, south of Belle Smith Springs, southeast of McCormick, March 12, 1959, R. A. Evers 59775; July 22, 1959, R. A. Evers 61171; on sandstone, Jackson Hollow (north section), southwest of McCormick, March 13, 1959, R. A. Evers 59776; October 8, 1959, R. A. Evers 62963; December 9, 1959, R. A. Evers 63234.

How many stations of the filmy fern are there in Illinois? No one knows. The station which Miss Strong saw during the first quarter of this century has been lost as a result of railroad construction. The total number of known stations in Illinois is now nine. The station from which Dr. Steagall made her collection in 1923 is the first one from which collections were obtained in Illinois. This station now appears on the decline. In the autumn of 1957, two sites were discovered in Hayes Creek Canyon. In walking along almost 50 miles of cliff bases since the autumn of 1957 I have found that filmy fern grows in five additional places in Pope County and one in Johnson County. Many more miles of cliffs remain to be examined in Pope and Johnson counties and in Hardin County to the east. No one knows how many more stations will be discovered in Illinois by explorations of these cliffs.

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The outside back cover shows a filmy fern frond about five times natural size.